

What is claimed is:

1 1. A power supply circuit for driving liquid crystal display
2 adapted to generate two or more drive voltages having
3 intermediate voltage levels with respect to a peak voltage
4 level, the intermediate voltage levels being classified into
5 a first group of levels and a second group of levels, said
6 power supply circuit for driving liquid crystal display
7 comprising:

8 an amplifier having a voltage follower configuration;

9 one or more capacitors connected to the amplifier, said
10 capacitors and said amplifier being provided for each level
11 of the first group of levels to generate a level in cooperation
12 with each other for the first group of levels; and

13 switching means controlled at a predetermined timing to
14 select a predetermined one of said capacitors to generate a
15 level with a discharge voltage of the capacitor and the peak
16 voltage level for the second group of levels.

1 2. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 1, wherein all levels are generated with
3 n number or less of said amplifier and n number or less of
4 the capacitors when the number of the levels is equal to $2n$
5 for the intermediate voltage levels, wherein n is an integer.

1 3. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 1, wherein all levels are generated with
3 n number or less of said amplifier and $3n$ number or less of

4 said capacitors when the number of the levels is equal to $4n$
5 for the intermediate voltage levels, wherein n is an integer.

1 4. A power supply circuit for driving liquid crystal display
2 adapted to generate four drive voltages having intermediate
3 voltage levels with respect to a peak voltage level, said power
4 supply circuit for driving liquid crystal display comprising
5 two amplifiers each having a voltage follower configuration,
6 two capacitors, and two switching means, the four intermediate
7 voltage levels being classified into a first group of levels
8 and a second group of levels, wherein:

9 said amplifiers and said capacitors generate a level for
10 the two levels of the first group of levels, and

11 said switching means controlled at a predetermined timing
12 selects a predetermined one of said capacitors to generate
13 a level with a discharge voltage of the capacitor and the peak
14 voltage level for the two levels of the second group of levels.

1 5. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 4, wherein said two capacitors are connected
3 with each other via a junction, one level forming the first
4 group of levels and another level forming the second group
5 of levels are successively generated at the junction.

1 6. A power supply circuit for driving liquid crystal display
2 adapted to generate four drive voltages having intermediate
3 voltage levels with respect to a peak voltage level, said power
4 supply circuit comprising one amplifier having a voltage

5 follower configuration, three capacitors, and three or four
6 switching means, the four intermediate voltage levels being
7 classified into a first group of levels and a second group
8 of levels, wherein:

9 said amplifiers and said capacitors generate a level for
10 the one level of the first group of levels, and

11 said switching means controlled at a predetermined timing
12 selects a predetermined one of said capacitors to generate
13 a level with a discharge voltage of the capacitor and the peak
14 voltage level for the remaining three levels of the second
15 group of levels.

1 7. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 1, further comprising a segment electrode
3 and an additional capacitor which is used to stabilize the
4 levels forming the second group of levels to a certain level
5 available for being supplied to the segment electrode.

1 8. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 1, wherein the capacitor or capacitors
3 used to generate have a function to stabilize the level, for
4 the levels for the second group of levels.

1 9. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 1, wherein the timing is determined so
3 as to be in synchronism with a display signal for a liquid
4 crystal display and selection of said capacitor(s) is performed

5 by said switching means at a timing that does not affect the
6 liquid crystal display.

1 10. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 9, wherein the display signal comprises
3 either one of a frame signal, a data output signal, and a signal
4 generated on the basis of the data output signal.

1 11. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 10, further comprising a common electrode
3 and a segment electrode, wherein the capacitor used to generate
4 a level to be connected to the common electrode is controlled
5 by a signal which is in synchronism with the frame signal and
6 wherein the capacitor used to generate a level to be connected
7 to the segment electrode is controlled by a signal which is
8 in synchronism with the data output signal.

1 12. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 1, wherein the timing is connected to said
3 capacitor(s) to generate a level only during a certain period
4 of switching the outputs and the timing is connected to a
5 predetermined level to charge the capacitor(s) during the
6 remaining period of time.

1 13. A power supply circuit for driving liquid crystal display
2 as claimed in Claim 1; wherein the first group of levels is
3 configured with the levels on a low potential side and wherein

- 4 said amplifier(s) and said capacitor(s) have a low withstanding
- 5 voltage.

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